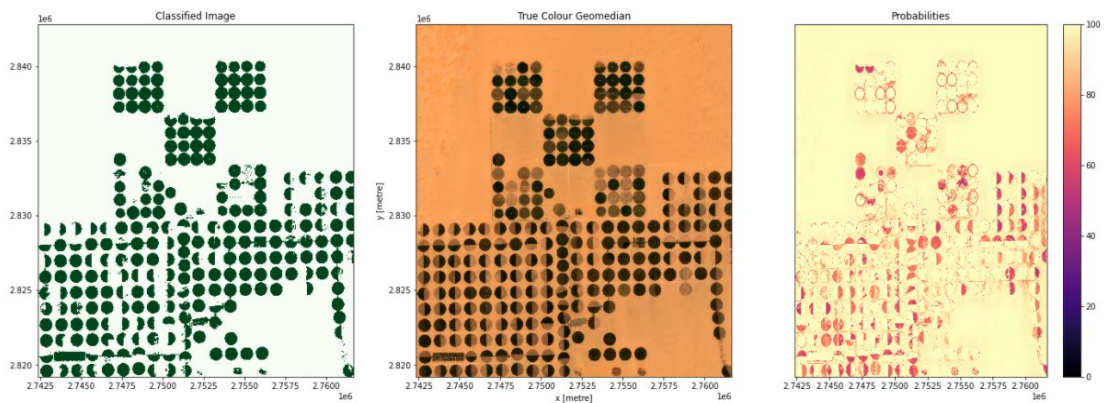
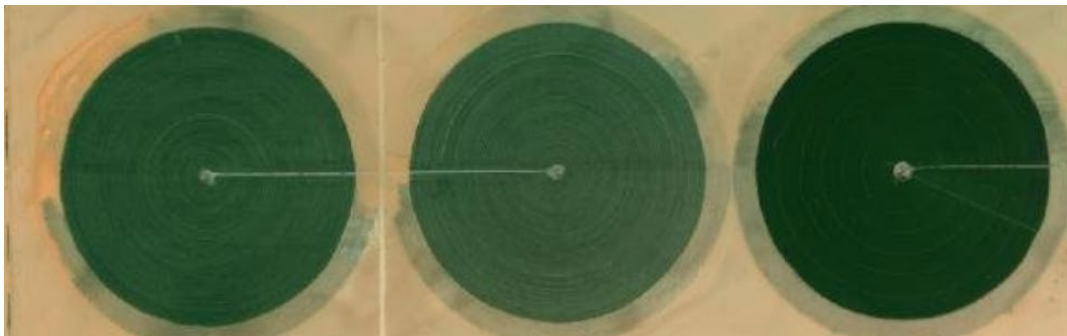




Digital Earth Africa

Quarterly program update: September - November 2020

30TH NOVEMBER, 2020



Al Wahat Al Dakhla Desert, New Valley Governorate, Egypt. (22°45'54.1"N 28°34'08.7"E)

About Digital Earth Africa

Our vision

Digital Earth Africa (DE Africa) will provide a routine, reliable and operational service, using Earth observations to deliver decision-ready products enabling policy makers, scientists, the private sector and civil society to address social, environmental and economic changes on the continent and develop an ecosystem for innovation across sectors.

Our mission

DE Africa will process openly accessible and freely available data to produce decision-ready products. Working closely with the AfriGEO community, DE Africa will be responsive to the information needs, challenges and priorities of the African continent. DE Africa will leverage and build on existing capacity to enable the use of Earth observations to address key challenges across the continent.

Program goals

The long-term goal for DE Africa Phase II is to improve the lives of Africans through access to tailored information for decision making. This encompasses¹:

- Livelihood strengthening – Earth observation (EO) data will support more informed decision making at government, sectoral and other levels, contributing to direct and indirect benefits for individuals and communities.
- Development effectiveness – DE Africa will support enhanced understanding of development challenges and solutions, and in so doing, strengthen collective impact and ability to assess progress towards national priorities, Agenda2063 and the SDGs.
- Digital transformation – through industry uptake and innovations, DE Africa will help fuel ongoing evolution of the digital economy in Africa.
- Economic development and job creation – through access to data for commercial products and services development, DE Africa will support new business development and employment opportunities.

Report purpose

This Quarterly Report provides a snap-shop of DE Africa Phase II progress made between September and November 2020, as aligned with DE Africa's Investment goals.

¹ These align with the 5 Outcome areas identified by the Governing Board, as per the [Governance Framework Document](#)



Progress summary

Technical highlights

Continental Scale Product Development for Food Security and Access to Water

Validation of our first continental-wide service, Water Observations from Space (WOfS), was completed this quarter, and we anticipate a fully operational service with accuracy assessment will be released in early 2021.

The Cropland Product co-development team has progressed validation work to support development and uptake of a continental cropland map product to address food security issues. The team are on track to produce a Beta product ready for use in February-March 2021.

All continental scale products are being co-developed with our Africa partners: the Regional Centre for Mapping of Resources for Development (RCMRD, Kenya); the Group on Earth Observations Global Agricultural Monitoring (GEOGLAM, representative based in Uganda), African Regional Institute for Geospatial Information Science and Technology (AFRIGIST, Nigeria), AGRHYMET (Niger) and the Ghana National Disaster Management Organisation (NADMO).



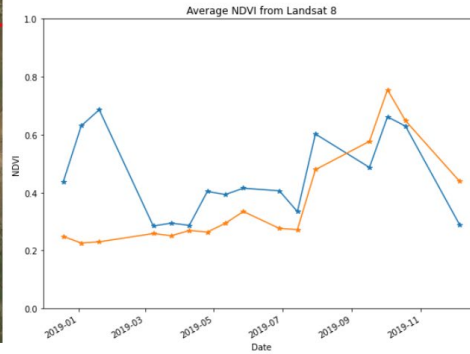
Image: A cloud-free image of all of Africa produced by combining tens of thousands of satellite image collected throughout an entire year

Growing Portfolio of DE Africa Sandbox Analysis Tools

We have a growing portfolio of tools available in the DE Africa Sandbox, which support advanced users to use, interact and engage with DE Africa data at a regional to local scale. Nearly 300 users now subscribe to this service and have access to notebooks (computational workflows and code) supporting the following analyses across Africa.

Agriculture and food security

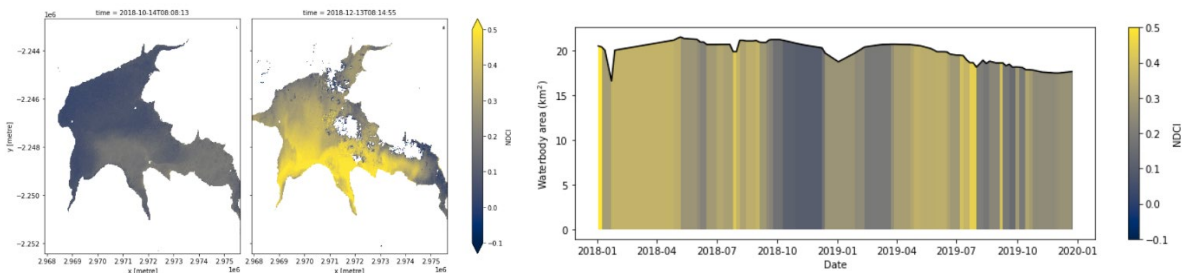
- **Vegetation Change Detection** - measures the presence and change in vegetation through time.
- **Crop health** – measures plant health over time and identify any changes in growth patterns between otherwise similar fields.



Crop health examples for maize farms in Eldoret, Kenya - use case developed by Stephen Korir, Kenya.

Water and flood risk

- **Water extent** – enables users to create their own customised WOfS products.
- **Water quality** – visualise how the water-level and presence of chlorophyll-a changes over time.



Normalised Difference chlorophyll-a Index for Lake Bosomtwe, Ghana, which is affected by pollution.

Land degradation and coastal change

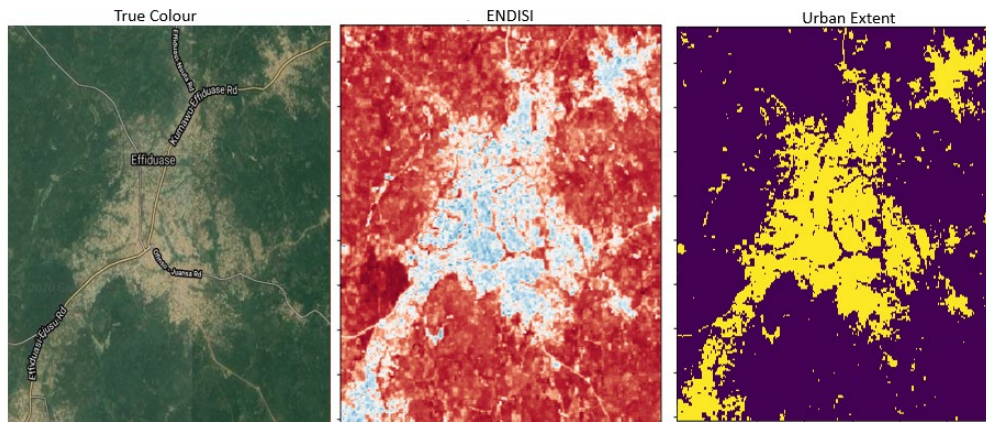
- **Coastal erosion** – accurately maps shoreline change through time.
- **Mangrove monitoring** – maps the change in extent of mangroves through time.
- **Modelling intertidal evaluation using tidal data** - monitors the rise and fall of the tide to reveal the three-dimensional shape of the coastline by mapping the boundary between water and land across a range of known tides (e.g. from low tide to high tide).



An example of the coastal erosion mapping tool over the port of Bargny, Senegal. The contours represent median high tides from 2013 - 2019, where lighter colours represent earlier years and the darker colours most recent. We can see the shoreline has noticeably receded over the last eight years.

Urbanisation

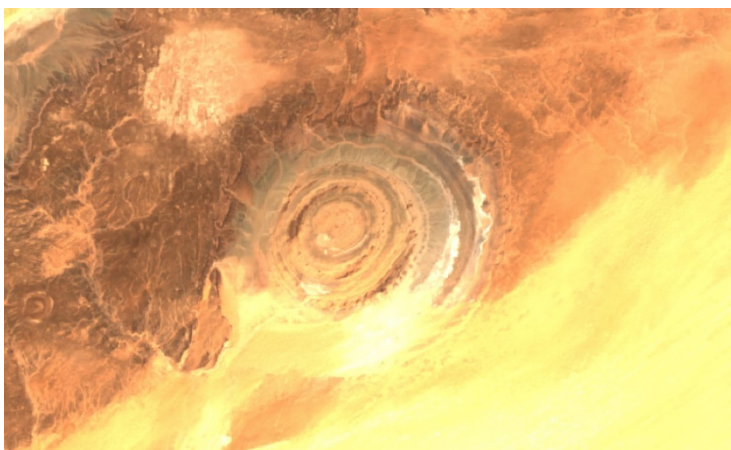
- **Urban extent change detection** - monitors urban expansion in order to track urban development over time.



Detecting urban extent using the Enhanced Normalized Difference Impervious Surfaces Index (ENDISI), Effiduase, Ghana.

Continental data now available in Africa

This quarter saw the completion of migration and access to Sentinel 2 data from the Amazon Web Services (AWS) facility in Oregon to their new centre in Cape Town. Countries across Africa now have access to locally stored analysis-ready satellite data, freely available through the Digital Earth Africa (DE Africa) platform. The movement of Sentinel-2 data to the AWS facility in Cape Town allows DE Africa to store data closer to our users, enabling them to access and analyse information more quickly. The movement of the data to the African continent marks an important milestone for the DE Africa project which aims to achieve operationally, technically, and financially sustainable services delivered by Africans, for the benefit of Africans.



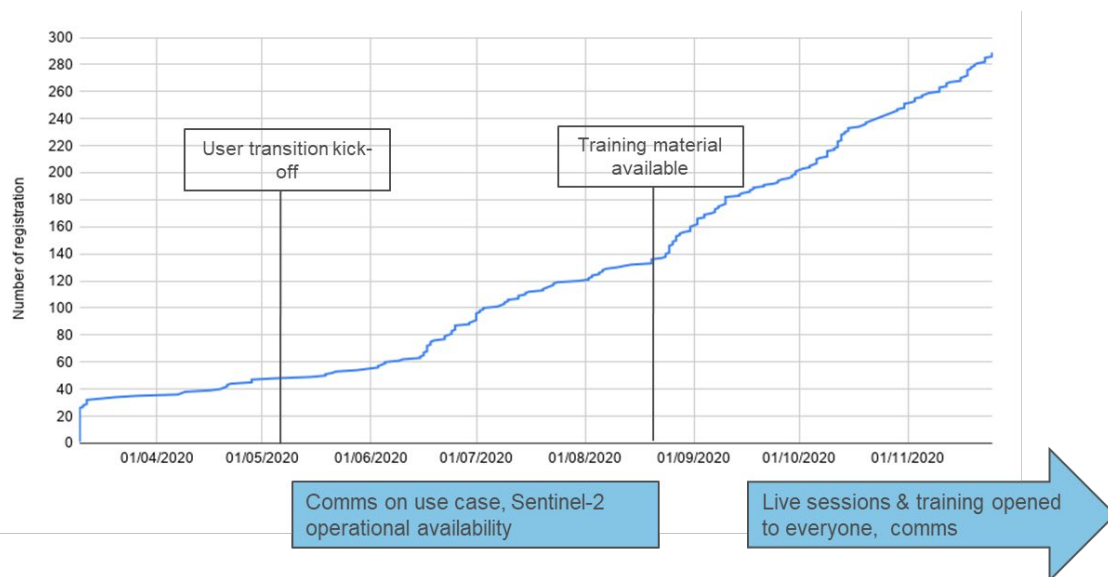
The Eye of Africa. This image was captured by Sentinel-2A on the 12th of November and is one of around 1200 scenes like it captured each day over the entire African continent and made available as part of DE Africa.

The Africa Regional Data Cube (ARDC) technical platform has been successfully transitioned to DE Africa. DE Africa now provides users with an equivalent or better level of service, expanding datasets and products to the continental scale, giving users access to data from all countries in Africa.

Growing capacity and uptake in Africa

As part of the migration from the ARDC to DE Africa, 45 ARDC users from 6 countries have successfully transitioned to the DE Africa platform this quarter after following a self-paced six-week training program. The program is now available online for everyone to access, opening the way to a larger scale in-country capacity development program with DE Africa implementing partners in Africa.

A strong African based user community is now developing. On-going weekly live sessions and an active WhatsApp group provide forums for users to continue to learn and share ideas. In addition, there are now 289 registered users of the DE Africa sandbox, an increase of approximately 240 users since May.

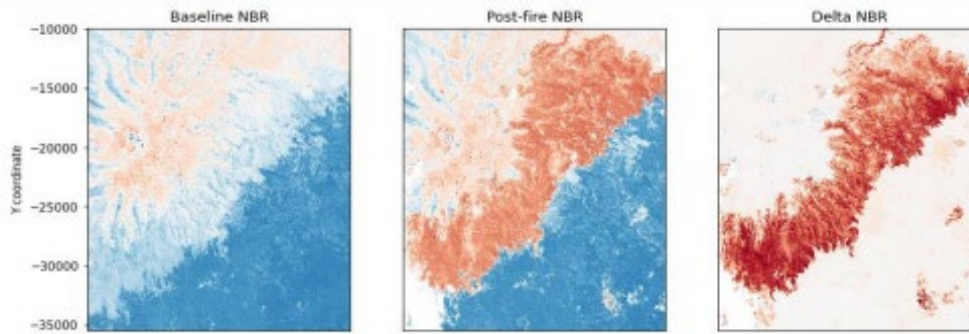


Evolution in the number of registered DE Africa sandbox users through time.

The next phase of DE Africa Capacity Development (CD) implementation began this quarter with a task team kick off meeting held on 11 November. The CD task team includes 24 active participants who are formed into working groups focused on strengthening the capacities of our African implementing partners, their end user organisations, the private sector, the broader DE Africa Community and aligned programs across the African continent.

This quarter saw a focus to increase uptake of the DE Africa platform through use case studies. Example use case studies developed this quarter are listed below, many of which are from African users who successfully complete the DE Africa training.

- Burn scar mapping using DE Africa for areas near Mt Kenya, developed by RCRMD. The burning of crops for improving productivity sometimes burn out of control. DE Africa provided the tools to assess the total area of burnt land for recovery planning and cost assessment.



Burnt area mapping, Mt Kenya National Park – use case developed by Lawrence Nganga, RCRMD Kenya.

- DE Africa Water extent notebooks are being used by the Kenyan Government for the monitoring of water of the Turkwel Dam, developed by RCRMD. The Turkwel dam is used for hydroelectric power production, irrigation, tourism and fisheries which are all vital for Kenya's economy.
- Ghana Statistical Services tested the use of DE Africa to support the 2017-2019 census. DE Africa have proposed urbanisation change detection tools and propose to train GSS to use them and improve current tools.
- An Illegal Mining monitoring notebook was developed this quarter for the Ghana Environmental Protection Agency. This collaboration includes engagement from both researchers and policy makers.
- Active water quality and water extent notebooks are now being tested. Possible users for these note books are being investigated, including: Water Resource Commission, UN World Water Quality Alliance, UNEP, University of Energy and Natural Resources, University of Ghana
- BigData Ghana did a successful test to access Landsat Geomedian using DE Africa data for use in a free application related to agriculture and infrastructure.
- A use case is being developed by Stella Mutai (Kenya) focused on the impact of severe drought on coffee production. Stella's work has made the short list for the Farming by Satellite Prize <http://www.farmingbysatellite.eu/awardceremony/>

Continued outreach and engagement

The first DE Africa webinar, titled '*Continental Data Validation*' was held on 12 November and marks the first in a series of webinars for the program. The Webinar was a platform to share the latest advances of the DE Africa program, products and services, and allowed stakeholders to more broadly discuss the challenges and opportunities of scaling the use of Earth observations across the continent. A discussion panel consisting of representatives from RCMRD, Observatory Sahara Sahel (OSS), AGRHYMET and AFRIGIST, covered the importance of building confidence in data products and how the first DE Africa continental service, Water Observations from Space (WOfS), can be applied. There were 94 attendees, with representation from 19 African countries, and active participation and questions from many.

DE Africa continued to be regularly profiled across a range of mediums and audiences:

- The Spatial Temporal Asset Catalogue (STAC) Sprint, hosted by Radiant Earth and sponsored by Digital Earth Africa, connected with the technical community in Africa to drive innovation using satellite data provided by Digital Earth Africa.
- DE Africa presented two sessions during World Space Week as part of a Space Generation Advisory Council (SGAC) webinar series.
- DE Africa hosted a (European Space Agency) ESA Phi-Week side event as an opportunity to demonstrate the platform and use of Copernicus data, and identifying a path to collaboration and innovation with ESA and the broader community.
- DE Africa participated in a panel discussion during GEO Week 2020 addressing the topic of: “Challenges and approaches to data sharing: The future of open data”.
- DE Africa presented at a Women in GIS event on the DE Africa program and our GEDSI strategy.
- DE Africa presented a key note speech at the RCRMD webinar Mapping for a Greater Good: How Earth Observations will help Africa achieve sustainable development goals”.



Since September 2020, DE Africa has 262 new twitter followers (total 1899) and has had 9833 unique website views. The DE Africa [LinkedIn page \(332 followers\)](#) continues to build stakeholder support and drive thought leadership.

Program establishment and partnerships

Significant progress has been made in establishing DE Africa as an operational entity in Africa:

A competitive selection process to host the Program Management Office is now underway. Four responses have received by interested organisations, which are now being evaluated by an independent panel with > 50% Africa representation. An announcement of the successful PMO host is expected early January.

Three organisations have signed financial Partnership Agreements to progress work on behalf of DE Africa in capacity and technical development, and communications and outreach.

A formal agreement was signed this quarter with the Group on Earth Observations (GEO) as an interim trust fund mechanism. The fund will provide ongoing African based human resource and project support for Year III and active recruitment commenced for an African based User Engagement Manager is already underway.

The Digital Earth Africa Monitoring, Learning and Evaluation framework is now being implemented to track and report progress against key program outcomes. Focus on M&E is being centred on Capacity Development work which includes the gathering of baseline information, activity reporting attributes (gender, diversity etc) and strategies and tools that can begin to support longer term impact evaluation etc.

The DE Africa Phase II [Gender, Equality, Diversity and Social Inclusion \(GEDSI\) Strategy](#) is being implemented this quarter with a focus on Capacity Development. GEDSI principles will be woven into its framework with a GEDSI specialist appointed into the task teams. Meetings were also held this quarter with Women in GIS Africa and Servir to determine possible areas of collaboration to progress GEDSI activities.

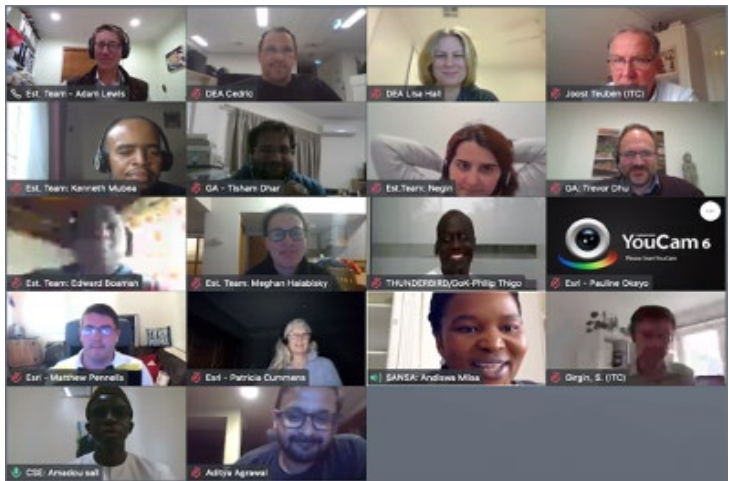
DE Africa has now signed 10 Memoranda of Understanding. New MOUs were signed this quarter with Centre de Suivi Ecologique (CSE), Senegal; African Regional Institute for Geospatial Information Science and Technology (AFRIGIST, Nigeria); Observatory Sahara Sahel (OSS); and the Ministry of ICT & Innovation of the Government of the Republic of Rwanda.

These new partnerships add to the international and technical partnerships that we already have, such as with the Group on Earth Observations (GEO) that provides a global mandate, with Amazon Web Services who are hosting 2 Petabytes of DE Africa data in their Public Data Store, with ESRI who have developed and maintain the Africa Geoportal, and the US-Aid and NASA funded SERVIR program which is providing vital technical tools to support validation work.

Governance implementation

The [DE Africa Governance Framework](#) is currently being updated prior to the inaugural DE Africa Governing Board meeting to reflect the move to a more distributed operational model. This will include board composition, governing principles and accountability. The timing of the first Governing has been delayed until selection of the Program Management Office Host is complete.

The [6th Technical Advisory Committee](#) meeting was held virtually on 4th September. 14 TAC members were present, including representatives from South Africa, Ethiopia, Senegal, Niger, Kenya, Nigeria, Sierra Leone, Tunisia, USA, Madagascar and Australia. The meeting showcased further technical successes, increased engagement from African users, and next steps in our capacity development program. Future development of two new continental scale products was endorsed (geomedian and fractional cover products) complementing food security/crop mask work and rangeland monitoring.



The DE Africa Stakeholder Community Group continues to grow and now has 740 subscribers (+69 since August 2020).